Serial No. 10/720,631
Docket H-205755

REMARKS

Claims 1-64 are pending in the present application. Reexamination and reconsideration are requested in light of the accompanying remarks.

The rejection of claims 48-64 under 35 U.S.C. §102(b) as being anticipated by Oda (U.S. Patent No. 4,551,220) is respectfully traversed. Oda discloses a gas diffusion electrode material which comprises a continuously micro-porous electrically insulating material and at least partially graphitized carbon black powder uniformly incorporated in the insulating material.

According to the examiner, Oda discloses a "a gas diffusion electrode material (column 2, lines 10-14) made of carbon powder, which is partially graphitized (column 3, lines 36-38), and PTFE (column 3, lines 17-20). A "liquid lubricant" is used to mix theses solids, but is then driven off (column 3, lines 23-26). The carbon content is at most 90% by weight (col. 3, line 68 through col. 4, line 2), which would mean that the PTFE content is at least 10% by weight. The porosity of the gas diffusion material is 40 to 95% (column 4, lines 31-32). The material forms a layer with a thickness of between 20 and 500 microns, preferably between 30 and 300 microns (col. 4, lines 40-42). Because the materials, porosities and thickness range fall within or largely overlap those presently disclosed, the other recited properties, namely the water vapor permeance and bulk density, would inherently accrue."

Inherency cannot be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. In order to establish inherency, the evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. MPEP 2112.

The cathode diffusion layer of the present invention is selected and constructed to have a water vapor permeance that is less than about 3×10^{-4} g/(Pa s m^2) at 80°C and 1 atmosphere. Water vapor permeance, a property which is not recognized by Oda, is dependent on the particular material being used for the cathode diffusion layer and how it is made. It can be controlled using a variety of properties, including layer thickness, bulk density, porosity, level of PTFE, using a special form of a conventional microporous layer, filling the porous volume of the

diffusion layer with carbon/graphite, or combinations thereof. See p. 6, line 19 to p. 10, line 14. For example, as discussed on pages 15-18 of the specification, tests were performed on a commercially available material made by Toray which is currently used in proton exchange membrane fuel cells, as well as a developmental material. The Toray material had different thicknesses. Only the thickest of the Toray samples had a water vapor permeance within the claimed range, while the others did not. See Declaration of Mark Mathias.

In addition, as discussed in the Declaration of Mark Mathias, the water vapor permeance of the gas diffusion electrode material of Oda can be estimated using the thicknesses and porosities given in the patent. The water vapor permeance of most of the thicknesses and porosities of the gas diffusion electrode material disclosed in Oda are outside the claimed range.

Thus, the thicknesses and porosities of the gas diffusion electrode material disclosed in Oda do not necessarily result in a water vapor permeance in the claimed range. Therefore, the claimed water vapor permeance is not inherent in the disclosure of Oda.

Furthermore, the claimed bulk density is not inherent in Oda. Oda discloses various thicknesses, amounts of PTFE, and porosity. Bulk density depends on the material used and how it is made. It can be altered by filling the porous volume of the diffusion layer substrate with carbon/graphite and fluoropolymer material. This would decrease the porosity, reduce the pore size, and increase the bulk density. See the Declaration of Mark Mathias. Thus, the claimed bulk density is not inherent in the disclosure of Oda.

Therefore, claims 48-64 are not anticipated by Oda.

The rejection of claims 1-4, 6-13, 15-22, 24-31, and 33-47 under 35 U.S.C. §103(a) as being unpatentable over Oda is respectfully traversed.

Oda cannot properly be combined with Matlock. In order to combine references, there must be some teaching, suggestion, or motivation to do so. Here, there is none. Oda teaches a material for a gas diffusion *electrode*. A gas diffusion electrode has a catalytic function and electrochemical reactions take place in it. Matlock teaches a gas diffusion *layer* which is adjacent to the catalytic layer, either anode or cathode, in a proton exchange membrane fuel cell. Matlock's gas diffusion *layer* is not an electrode, and no electrochemical reactions take place in it.

The examiner stated that "Oda *et al.* teach that gas diffusion *electrodes* are useful as fuel and oxygen electrodes in fuel cells (column 1, lines 9-11), but do not specify proton exchange membrane (PEM) fuel cells or their particular structure. Matlock *et al.* disclose the structure of a PEM fuel cell, which includes an electrolyte between two catalyst layers, with gas diffusion *layers* each disposed on the catalyst layers, on the opposite side therof from the electrolyte (column 1, line 58 through column 2, line 4). Because Matlock *et al.* teach that gas diffusion *layers* are useful in PEM fuel cells it would have been obvious to use the gas diffusion *layers* of Oda *et al.* in a PEM fuel cell as disclosed by Matlock *et al.*" [Emphasis added.] Contrary to the examiner's statement at the end of the paragraph, Oda does not teach a gas diffusion *layer*, but rather a gas diffusion *electrode*.

In addition, Oda does not envision a proton exchange membrane fuel cell, and the idea of keeping the membrane wet when the channel gas is dry, is not relevant in Oda's system.

Therefore, there is no teaching or suggestion to combine the gas diffusion electrode of Oda with the proton exchange membrane fuel cell of Matlock.

Even if the two references are properly combinable, they do not render the claimed invention obvious. A proper combination of Oda and Matlock would substitute the gas diffusion *electrode* of Oda for the *electrode* of Matlock. This is not the claimed invention.

In addition, Oda does not inherently disclose the claimed water vapor permeance or bulk density. Matlock is cited as teaching the structure of a PEM fuel cell. Matlock does not cure the deficiencies of Oda.

Therefore, claims 1-4, 6-13, 15-22, 24-31, and 33-47 would not have been obvious to one of ordinary skill in the art at the time the invention was made over Oda in view of Matlock.

Applicants gratefully acknowledge the examiner's statement that claims 5, 14, 23, and 32 would be allowable if rewritten in independent form including all of the limitations of the intervening claims. In view of the arguments made above, this was not deemed necessary.

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CONCLUSION

Applicants respectfully submit that, in view of the above remarks, the application is now in condition for allowance. Applicants respectfully request that claims 1-64 be passed to allowance.

If the Examiner has any questions or comments regarding the present application, he is invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,
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